Claims 1-15 are presented for consideration. Claims 1, 10 and 13-15 are independent. Claims 1-8, 10 and 12-14 have been amended to clarify features of the invention, while claim 15 has been added to recite additional features of the invention. Applicant submits that, as amended, these claims comply with all aspects of 35 U.S.C. §112. Support for these changes and addition can be found in the application, as filed. Therefore, no new matter has been added.

Turning now to the art rejections, claims 1, 3, 5, 6, and 10 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,559,584 to Miyaji et al. Claims 1-7 and 10 were rejected under 35 U.S.C. §102(e) as`` being anticipated by U.S. Patent No. 6,341,006 to Murayama et al. Claims 1-7 and 10 were also rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,451,507 to Suenaga et al. Claims 8, 9, and 11-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over either Suenaga et al. or Murayama et al., in view of U.S. Patent No. 5,243,377 to Umatate et al. Applicant submits that the cited art does not teach many features of the present invention, as previously recited in claims 1-14. Therefore, these rejections are respectfully traversed. Nevertheless, Applicant submits that the pending claims, as currently presented, amplify the distinctions between the present invention and the cited art.

Applicant requests favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Independent claim 1 relates to an exposure apparatus for illuminating a reticle with exposing light from an exposing light source via an illuminating optical system, and projecting a pattern, which has been formed on the reticle, onto a substrate via a projection optical system.

The exposure apparatus includes a vessel, gas supplying means, vacuum exhaust means, and a pressure valve. Within the vessel is placed one of the illumination optical system and the projection optical system. The gas supplying means supplies a desired gas to the vessel. The vacuum exhaust means vacuum evacuates the vessel in order to establish negative pressure in the interior thereof from atmospheric pressure. The pressure valve prevents a differential pressure between an internal pressure of the vessel and atmospheric pressure from exceeding a predetermined value.

The Miyaji et al. patent relates to an exposure apparatus having a vessel including an illuminating optical system and a projection optical system. Nitrogen is supplied to the vessel so that an internal pressure of the vessel exceeds atmospheric pressure. After a reticle is transferred to the vessel, the vessel is evacuated and ionized nitrogen gas is supplied to the vessel. The Miyaji et al. patent, however, fails to disclose or suggest, *inter alia*, the use of a pressure valve for preventing a differential pressure between an internal pressure of the vessel and atmospheric pressure from exceeding a predetermined value, as recited in independent claim 1.

The Murayama et al. patent relates to a projection exposure apparatus and discloses performing gas replacement in a chamber containing an illuminating optical system and a projection optical system. The chamber is evacuated using a vacuum pump and is then supplied with an inert gas. However, the Murayama et al. patent also does not disclose or suggest, *inter alia*, the use of a pressure valve for preventing a differential pressure between an internal pressure of the vessel and atmospheric pressure from exceeding a predetermined value, as recited in independent claim 1.

The Suenaga et al. patent relates to an exposure apparatus and discloses supplying nitrogen gas at adjusted temperature and in a controlled flow amount to a casing, which houses an illuminating optical system and a projection optical system. Gas replacement is performed in a gas replacement chamber by supplying a predetermined gas to the replacement chamber after the inner pressure within the replacement chamber has been reduced. The Suenaga et al. patent also fails to disclose or suggest, *inter alia*, the use of a pressure valve for preventing a differential pressure between an internal pressure of the vessel and atmospheric pressure from exceeding a predetermined value, as recited in independent claim 1.

The Examiner cites the Umatate et al. patent for the teaching of a computer system used to control an exposure apparatus. The Umatate et al. patent, however, fails to remedy the above-noted deficiencies in the cited art. For example, the Umatate et al. patent does not disclose or suggest the use of a pressure valve for preventing a differential pressure between an internal pressure of the vessel and atmospheric pressure from exceeding a predetermined value, as recited in independent claim 1.

Independent claims 10, 13, and 14 are respectively directed to a method of manufacturing a semiconductor device, a semiconductor manufacturing plant, and a method of maintaining an exposure apparatus, and each recites features similar to those of independent claim 1. Thus, claims 10, 13, and 14 are believed allowable over the cited art for at least the same reasons set forth above with respect to claim 1.

New independent claim 15, relates to an exposure apparatus and recites, *inter alia*, a first pressure valve for preventing a differential pressure between internal pressure of said first vessel

and atmospheric pressure from exceeding a predetermined value, and a second pressure valve for preventing a differential pressure between internal pressure of said first vessel and atmospheric pressure from exceeding a predetermined value. As discussed above, such features are not disclosed or suggested by the cited art.

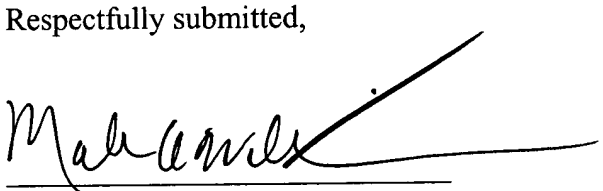
For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1, 10 and 13-15, is patentably defined over the cited art, whether that art is taken individually or in combination.

The dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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APPENDIX A

IN THE ABSTRACT

[Disclosed is an] An exposure apparatus for illuminating a reticle with exposing light from an exposing light source via a light-source lens system [constituting illumination optics], and projecting a pattern, which has been formed on the reticle, onto a wafer via a projection lens system [constituting projection optics], thereby exposing the wafer to the [patter] pattern. The apparatus includes vessels for hermetically sealing the light-source lens system and the projection lens system disposed on the optical path of the exposing light from the exposing light source to the reticle, [means] a gas supply unit for supplying the vessels with a specific gas, a vacuum source for evacuating the interior of the vessels, a vacuum-pressure controller for exercising control to hold the internal pressure of the vessels constant, and an escape valve for reducing the differential pressure between the internal pressure of the vessels and atmospheric pressure to a value below a predetermined pressure.

IN THE SPECIFICATION:

Please substitute the paragraph beginning at page 1, line 21, and ending on page 2, line 12, with the following.

-- However, it is known that exposing light causes impurities in the air to react photochemically with oxygen in an exposure apparatus that uses i lines (wavelength $\lambda = 365$ nm) as the exposing light and in an exposure apparatus that uses exposing light, the wavelength [whereof] of which is shorter than that of i lines. Such reaction products (fogging substances) attach themselves to glass members and produce an opaque fog on the glass members. A typical example of such a fogging substance is ammonium sulfate $(NH_4)_2SO_4$, which is produced by a reaction (oxidation) with oxygen in the air, if sulfur dioxide (SO_2) absorbs the energy of the exposing light and attains the excited state. The ammonium sulfate is white in color and results in fogging when it attaches itself to the surfaces of optical members such as lenses and mirrors. The exposing light is scattered and absorbed by the ammonium sulfate, as a consequence of which, there is a decline in the transmittance of the optical system. --

Please substitute the paragraph beginning at page 3, line 5, and ending at line 22, with the following.

-- In recent years, however, the illuminating systems of exposure apparatus have [been] become increasingly complex in order to achieve diverse illuminating conditions and deformed illumination. As a consequence, maintenance is essential and the spaces filled with the inert gas frequently are exposed to the outside atmosphere whenever such maintenance is carried out. In

addition, the inert gas used, such as nitrogen or helium, may have an influence upon the human body. This means that while maintenance is being performed, the supply of the inert gas must be stopped in order to assure safety. A consequence of this is that the interior of the vessel becomes filled with atmospheric air during maintenance work. After maintenance, the atmospheric air within the vessel must be replaced with inert gas again. Furthermore, if the exposure apparatus is out of action for a long period of time, it is likewise necessary for the inert gas to be substituted. --

Please substitute the paragraph beginning at page 9, line 17, and ending on page 10, line 1, with the following.

-- Atmospheric air flows into the vessel 3 if the vessel is opened for maintenance or for some other reason. Further, when the exposure apparatus E1 is placed in operation again after having been opened, it is necessary to replace the atmospheric air in vessel 3 with inert gas again. In such a case, a changeover is made to the evacuation side by the gas-exhaust changeover unit 16 on the exhaust side to thereby evacuate the interior of the vessel 3. The internal pressure of the first vessel 3 is made a suitable negative pressure or is caused to pulsate at a negative pressure and is supplied with the gas from the gas supply unit 11. --

Please substitute the paragraph beginning at page 10, line 2, and ending at line 7, with the following.

-- The [described] description rendered above deals with the components of the illumination system. However, similar effects can be obtained by a similar method applied to substitution (not shown) of gas such as inert gas within the lens vessel (a second vessel) in the projection lens system 6. --

Please substitute the paragraph beginning at page 11, line 10, and ending on page 12, line 4, with the following.

-- Fig. 2 illustrates the overall system as seen from a certain angle. The system includes the business office 101 of the vendor (equipment supplier) that provides the equipment for manufacturing semiconductor devices. Semiconductor manufacturing equipment for performing various processes used in a semiconductor manufacturing plant is assumed to be the manufacturing equipment. Examples of the equipment are pre-treatment equipment (lithographic equipment such as exposure equipment, resist treatment equipment and etching equipment, heat treatment equipment, thin-film equipment and smoothing equipment, etc.) and post-treatment equipment (assembly equipment and inspection equipment, etc.). The business office 101 includes a host management system 108 for providing a manufacturing-equipment maintenance database, a plurality of control terminal computers 110, and a local-area network (LAN) 109 for connecting these components into an intranet. The host management system 108 has a gateway for connecting the LAN 109 to the Internet 105, which is a network external to the business office 101, and a security function for limiting access from the outside. --

Please substitute the paragraph beginning at page 14, line 8, and ending at line 22, with the following.

-- In the example of Fig. 3, on the other hand, a plant having manufacturing equipment provided by a plurality of vendors is connected by an outside network to management systems of respective ones of the vendors of these plurality of pieces of manufacturing equipment, and maintenance information for each piece of manufacturing equipment is communicated by data communication. As shown in the drawing, the system includes a manufacturing plant 201 of the user of the manufacturing equipment (e.g., the maker of semiconductor devices). The manufacturing line of this plant includes manufacturing equipment for implementing a variety of processes. Examples of such equipment are exposure equipment 202, resist treatment equipment 203 and thin-film treatment equipment 204. --

Please substitute the paragraph beginning at page 14, line 23, and ending on page 15, line 9, with the following.

-- Though only one manufacturing plant 201 is shown in Fig. 3, in actuality, a plurality of these plants are networked in the same manner. The pieces of equipment in the plant are interconnected by a LAN 206 to construct an intranet and the operation of the manufacturing line is managed by a host management system 205. The business offices of vendors (equipment suppliers) such as an exposure equipment maker 210, resist treatment equipment maker 220 and thin-film treatment equipment maker 230 have host management systems 211, 221, 231,

respectively, for remote maintenance of the equipment they have supplied. These have maintenance databases and gateways to the outside network, as described earlier. --

Please substitute the paragraph beginning at page 15, line 21, and ending at line 26, with the following.

-- Each piece of manufacturing equipment installed in the semiconductor manufacturing plant has a display, a network interface and a computer for executing network-access software and equipment operating software stored in a storage device. The storage device can be an internal memory or a hard disk or a network file server. --

Please substitute the paragraph beginning at page 17, line 16, and ending on page 18, line 5, with the following.

-- A semiconductor chip is obtained, using the wafer fabricated at step 4, at step 5 (assembly), which is also referred to as "post-treatment". This step includes steps such as actual assembly (dicing and bonding) and packaging (chip encapsulation). The semiconductor device fabricated at step 5 is subjected to inspections such as an operation verification test and a durability test at step 6 (inspection). The semiconductor device is completed through these steps and then is shipped (step 7). The pre- and post-treatments are performed at separate special-purpose plants. Maintenance is carried out on a per-plant basis by the above-described remote maintenance system. Further, information for production management and equipment

maintenance is communicated by data communication between the pre- and post-treatment plants via the Internet or a leased-line network. --

IN THE CLAIMS

1. (Amended) An exposure apparatus for illuminating a reticle with exposing light from an exposing light source via an illuminating optical system and projecting a pattern, which has been formed on the reticle, onto a substrate via a projection optical system, said apparatus comprising:

[a first vessel within which the illuminating optical system is placed;]

a [second] vessel within which one of the illumination optical system and the projection optical system is placed;

gas supplying means for supplying a desired gas to said vessel;

[said first vessel having an inlet and an outlet for a first gas and said second vessel having an inlet and an outlet for a second gas;

substitution means for substituting the first gas and/or the second gas for a gas in the interior of said first vessel and/or said second vessel; and]

vacuum exhaust means for vacuum evacuating said [first vessel and/or said second] vessel in order to establish negative pressure in the interior thereof [when the first gas and/or the second gas is substituted for the gas in the interior of said first vessel and/or said second vessel] from atmospheric pressure; and

a pressure valve for preventing a differential pressure between an internal pressure of said vessel and an atmospheric pressure from exceeding a predetermined value.

2. (Amended) The apparatus according to claim 1, wherein the [first] desired gas is one of an inert gas and [the second gas is] a specific active gas.

3. (Amended) The apparatus according to claim 1, wherein said vacuum exhaust means comprises a vacuum source for creating a vacuum in said vessel, and a vacuum-pressure controller for controlling pressure within said vessel, [further comprising:

first and second vacuum sources connected to the gas outlets of said first and second vessels, respectively; and

first and second vacuum-pressure controllers, which are] wherein said vacuum-pressure controller is provided in piping leading from said [first and second vessels to said first and second vacuum sources, respectively, for controlling pressure within said first and second vessels, respectively] vessel to said vacuum source.

4. (Amended) The apparatus according to claim 3, further comprising:

a densitometer for measuring concentration of the gas in said vessel;

atmosphere-release means for atmosphere-releasing to said vessel exhaust gas within said vessel; and

changeover means for switching [automatically between an evacuation mechanism, which includes the first and/or second vacuum sources, and an atmosphere-release mechanism] a gas exhaust line from said vacuum exhaust means to said atmosphere-release means if concentration of [the first gas and/or the second] gas in said [first vessel and/or said second] vessel attains a predetermined concentration.

5. (Amended) The apparatus according to claim 1, [further comprising first and second escape valves for releasing] wherein said pressure valve is a valve for atmosphere-releasing to reduce internal pressure of said [first and second vessels, respectively, if a differential pressure between internal pressure of said first vessel and/or said second vessel and the atmosphere exceeds a predetermined value] vessel.

6. (Amended) The apparatus according to claim 1, [further comprising:

first control means for controlling flow rate of the first gas and/or the second gas introduced into said first vessel and/or said second vessel; and

second] wherein said vacuum exhaust means comprises pressure control means for controlling a differential pressure between internal pressure of [each] said vessel and the atmosphere so as to hold the differential pressure constant.

7. (Amended) The apparatus according to claim [3] 1, wherein [pulsation is produced by varying] said vacuum exhaust means comprises pressure control means for controlling internal

pressure of said vessel to pulsate the internal pressure at a predetermined frequency [by said first vacuum-pressure controller and/or said second first vacuum-pressure controller, thereby exhausting the gas from within said first vessel and/or said second vessel; and

internal pressure of said first vessel and/or said second vessel is caused to pulsate at negative pressure, thereby supplying the first gas and/or the second gas to said first vessel and/or said second vessel] in a range from negative pressure to atmospheric pressure.

8. (Amended) The apparatus according to claim 1, further comprising a display, a network interface and a computer for running network software[;],

wherein maintenance information relative to said exposure apparatus is capable of being communicated via a computer network.

10. (Amended) A method of manufacturing a semiconductor device, comprising the steps of:

placing a group of manufacturing equipment, including an exposure apparatus for performing various processes, [inclusive of an exposure apparatus,] in a plant for manufacturing semiconductor devices; and

manufacturing a semiconductor device by performing a plurality of processes using [this] the group of manufacturing equipment[;],

wherein said exposure apparatus includes:

[a first vessel within which the illuminating optical system is placed;]

a [second] vessel within which [the] one of an illuminating optical system and a projection optical system is placed;

gas supplying means for supplying a desired gas to said vessel;

[said first vessel having an inlet and an outlet for a first gas and said second vessel having an inlet and an outlet for a second gas;

substitution means for substituting the first gas and/or the second gas for a gas in the interior of said first vessel and/or said second vessel; and]

vacuum exhaust means for vacuum evacuating said [first vessel and/or said second] vessel in order to establish negative pressure in the interior thereof [when the first gas and/or the second gas is substituted for the gas in the interior of said first vessel and/or said second vessel] from atmospheric pressure; and

a pressure valve for preventing a differential pressure between an internal pressure of said vessel and an atmospheric pressure from exceeding a predetermined value.

12. (Amended) The method according to claim 11, [wherein] further comprising performing one of (i) obtaining maintenance information for said manufacturing equipment [is obtained] by accessing, by data communication via the external network, a database provided by a vendor or user of said exposure apparatus, [or] and (ii) performing production management [is performed] by data communication with a semiconductor manufacturing plant other than said first-mentioned semiconductor manufacturing plant via the external network.

13. (Amended) A semiconductor manufacturing plant, comprising:

a group of manufacturing equipment, including an exposure apparatus, for performing various processes[, inclusive of an exposure apparatus]; and

a gateway for making it possible to access, from [said] a local-area network, an external network outside the plant[;], whereby information relating to at least one of the pieces of manufacturing equipment can be communicated by data communication[;],

wherein said exposure apparatus includes:

[a first vessel within which the illuminating optical system is placed;]

a [second] vessel within which [the] one of an illumination optical system and a projection optical system is placed;

gas supplying means for supplying a desired gas to said vessel;

[said first vessel having an inlet and an outlet for a first gas and said second vessel having an inlet and an outlet for a second gas;

substitution means for substituting the first gas and/or the second gas for a gas in the interior of said first vessel and/or said second vessel; and]

vacuum exhaust means for vacuum evacuating said [first vessel and/or said second] vessel in order to establish negative pressure in the interior thereof [when the first gas and/or the second gas is substituted for the gas in the interior of said first vessel and/or said second vessel] from atmospheric pressure; and

a pressure valve for preventing a differential pressure between an internal pressure of said vessel and an atmospheric pressure from exceeding a predetermined value.

14. (Amended) A method of maintaining an exposure apparatus that has been installed in a semiconductor manufacturing plant, said method comprising the steps of:

providing a maintenance database, which is connected to an external network of the semiconductor manufacturing plant, by a vendor or user of the exposure apparatus;

allowing access to [said] the maintenance database from within the semiconductor manufacturing plant via [said] the external network; and

transmitting maintenance information, which is stored in [said] the maintenance database, to the [side] outside of the semiconductor manufacturing plant via [said] the external network[;],

wherein said exposure apparatus includes:

[a first vessel within which the illuminating optical system is placed;]

a [second] vessel within which [the] one of an illuminating optical system and a projection optical system is placed;

gas supplying means for supplying a desired gas to the vessel;

[said first vessel having an inlet and an outlet for a first gas and said second vessel having an inlet and an outlet for a second gas;

substitution means for substituting the first gas and/or the second gas for a gas in the interior of said first vessel and/or said second vessel; and]

vacuum exhaust means for vacuum evacuating said [first vessel and/or said second] vessel in order to establish negative pressure in the interior thereof [when the first gas and/or the second gas is substituted for the gas in the interior of said first vessel and/or said second vessel] from atmospheric pressure; and

a pressure valve for preventing a differential pressure between an internal pressure of said vessel and an atmospheric pressure from exceeding a predetermined value.

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